Section 1 - CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NAME
CIGWELD TUNGSTEN WELDING ELECTRODES

SYNONYMS

"Product Code: VB1702, VB1703, VB1704", "VB1705, VB1706, VB1692, VB1693, VB1694", "699846, 699847, 699848", "Thoriated, Zirconiated, Ceriated Tungsten Electrode"

PRODUCT USE
Gas tungsten arc welding.

SUPPLIER
Company: CIGWELD Pty Ltd
Address:
71 Gower Street
Preston
VIC 3072
AUS
Telephone: (03) 9474 7400
Telephone: 1300 654 674
Emergency Tel: (03) 9474 7400

Section 2 - HAZARDS IDENTIFICATION

STATEMENT OF HAZARDOUS NATURE
HAZARDOUS SUBSTANCE. NON-DANGEROUS GOODS. According to the Criteria of NOHSC, and the ADG Code.

POISONS SCHEDULE
None

RISK	SAFETY
May cause CANCER.	Keep locked up. Avoid exposure - obtain special instructions before use. To clean the floor and all objects contaminated by this material, use water and detergent. This material and its container must be disposed of in a safe way. Keep away from food, drink and animal feeding stuffs.

Section 3 - COMPOSITION / INFORMATION ON INGREDIENTS

NAME	CAS RN	%
electrode wire as alloy of		
tungsten	7440-33-7	
and		
for Thoriated Tungsten Electrode		
thorium oxide	1314-20-1	<5
for Zirconiated Tungsten Electrode		

continued...

zirconium dioxide for Ceriated Tungsten Electrode	1314-23-4	<5^
cerium(IV) oxide During use product generates	1306-38-3	<5^
welding fumes gaseous byproducts from welding	Not avail.	>60
nitrogen dioxide	10102-44-0	
ozone	10028-15-6	

Section 4 - FIRST AID MEASURES

SWALLOWED

Not normally a hazard due to the physical form of product. The material is a physical irritant to the gastro-intestinal tract.

EYE

- Particulate bodies from welding spatter may be removed carefully.
- DO NOT attempt to remove particles attached to or embedded in eye.
- Lay victim down, on stretcher if available and pad BOTH eyes, make sure dressing does not press on the injured eye by placing thick pads under dressing, above and below the eye.
- Seek urgent medical assistance, or transport to hospital.
- For "arc eye", i.e. welding flash or UV light burns to the eye:
- Place eye pads or light clean dressings over both eyes.
- Seek medical assistance.

SKIN

If skin or hair contact occurs:
- Flush skin and hair with running water (and soap if available).
- Seek medical attention in event of irritation.

INHALED

- If fumes or combustion products are inhaled remove from contaminated area.
- Lay patient down. Keep warm and rested.
- Prostheses such as false teeth, which may block airway, should be removed, where possible, prior to initiating first aid procedures.
- Apply artificial respiration if not breathing, preferably with a demand valve resuscitator, bag-valve mask device, or pocket mask as trained. Perform CPR if necessary.
- Transport to hospital, or doctor.

NOTES TO PHYSICIAN

EDTA is believed to merit consideration in removing thorium from the body following accidental overexposure. [Patty's Industrial Hygiene & Toxicology]

Personnel working with thorium compounds should be monitored for early symptoms and changes such as abnormal leukocytes in blood smears. Urine samples, whole body radiation counts and breath radon are useful tests to monitor exposure.

Section 5 - FIRE FIGHTING MEASURES

EXTINGUISHING MEDIA

- There is no restriction on the type of extinguisher which may be used.

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FIRE FIGHTING
- Alert Fire Brigade and tell them location and nature of hazard.
- Wear breathing apparatus plus protective gloves for fire only.
- Prevent, by any means available, spillage from entering drains or water courses.
- Use fire fighting procedures suitable for surrounding area.
- DO NOT approach containers suspected to be hot.
- Cool fire exposed containers with water spray from a protected location.
- If safe to do so, remove containers from path of fire.
- Equipment should be thoroughly decontaminated after use.

FIRE/EXPLOSION HAZARD
- Non combustible.
- Not considered to be a significant fire risk, however containers may burn.
- In a fire may decompose on heating and produce toxic / corrosive fumes.

FIRE INCOMPATIBILITY
Welding electrodes should not be allowed to come into contact with strong acids or other substances which are corrosive to metals.
Welding arc and metal sparks can ignite combustibles.

HAZCHEM: None

Section 6 - ACCIDENTAL RELEASE MEASURES

EMERGENCY PROCEDURES

MINOR SPILLS
Sweep up.
Place in suitable containers for disposal.

MAJOR SPILLS
- Minor hazard.
- Clear area of personnel.
- Alert Fire Brigade and tell them location and nature of hazard.
- Wear physical protective gloves e.g. Leather.
- Contain spill/secure load if safe to do so.
- Bundle/collect recoverable product and label for recycling.
- Collect remaining product and place in appropriate containers for disposal.
- Clean up/sweep up area.
- Water may be required.

Personal Protective Equipment advice is contained in Section 8 of the MSDS.

Section 7 - HANDLING AND STORAGE

PROCEDURE FOR HANDLING
- Limit all unnecessary personal contact.
- Wear protective clothing when risk of exposure occurs.
- Use in a well-ventilated area.
- Avoid contact with incompatible materials.
- When handling, DO NOT eat, drink or smoke.
- Keep containers securely sealed when not in use.
- Avoid physical damage to containers.
- Always wash hands with soap and water after handling.

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- Work clothes should be laundered separately.
- Use good occupational work practice.
- Observe manufacturer's storing and handling recommendations.
- Atmosphere should be regularly checked against established exposure standards to ensure safe working conditions are maintained.

SUITABLE CONTAINER

Packaging as recommended by manufacturer.
- Check that containers are clearly labelled.

STORAGE INCOMPATIBILITY

Segregate from strong acids.

STORAGE REQUIREMENTS

- Keep dry.
- Store under cover.
- Protect containers against physical damage.
- Observe manufacturer's storing and handling recommendations.

Section 8 - EXPOSURE CONTROLS / PERSONAL PROTECTION

EXPOSURE CONTROLS

Source	Material	TWA ppm	TWA mg/m³	STEL ppm	STEL mg/m³	Peak ppm	Peak mg/m³	TWA F/CC
Australia Exposure Standards	tungsten (Tungsten, insoluble compounds (as W))		5		10			
Australia Exposure Standards	nitrogen dioxide (Nitrogen dioxide)	3	5.6	5	9.4			
Australia Exposure Standards	ozone (Ozone)					0.1	0.2	

The following materials had no OELs on our record under the following CAS or Chemwatch (CW) numbers

- CIGWELD Tungsten Welding Electrodes CW:17931
- tungsten: No data available for CAS:7440-33-7
- thorium oxide: No data available for CAS:1314-20-1 CW:6590
- welding fumes: No data available for CW:35201

EMERGENCY EXPOSURE LIMITS

Material	Revised IDLH Value (mg/m3)	Revised IDLH Value (ppm)
nitrogen dioxide		20
ozone		5

.

Not available. Refer to individual constituents.

INGREDIENT DATA

TUNGSTEN:

Insoluble tungsten compounds include all those for which water solubility is listed as insoluble or less than 0.01 gm/100 cc water. The recommended TLV-TWA and STEL reflects the reported physiologic activity of insoluble compounds of tungsten. OSHA concluded that

continued...

these limits would reduce the risk of pulmonary fibrosis.

THORIUM OXIDE:

As the principal hazard of exposure to thorium compounds is radiological, concentration limits set for Th(232) and Th(228) should be observed. Exposure limits for radioactive materials are based upon their pulmonary clearance times. To describe the clearance of inhaled radioactive materials from the lungs, materials are classified as D, W or Y which refers to their retention time in the pulmonary region. The classification applied to a range of half-lives for;

D: less than 10 days; W: 10-100 days and for Y: greater than 100 days.

For natural thorium : Th(232); Annual Limits of Intake (ALI) Inhalation:

Class W: 90 Bq

Class Y: 90 Bq Annual Limits of Intake (ALI) Oral (classes do not apply): 50,000 Bq Derived Air Concentration Limits: 0.0375 Bq/m3.

Radiation: Annual Limits on Intake (ALI) of radionuclides:

Radiation Workers - 20 milliSieverts (mSv) per year averaged over 5 years with a maximum of 50 mSV in any one year.

Members of Public - 1 mSv [ICRP Publication 60, 1990]

(10 mSv = 1 rem)

Recent debate(1) suggests that levels below 1 mSv a year can be harmful to humans as a result of cell damage that can only be detected after several divisions (radiation -induced genomic instability). Progeny of cells irradiated, in vitro, with extremely low levels of alpha-radiation (equivalent to a single alpha-particle passing through a single cell) contained three and a half times as many chromosomal aberrations, after 10-13 divisions, as descendants of cells that were not irradiated. Further evidence is suggestive that some individuals may carry genes that protect them from radiation-induced damage of this type.

(1) New Scientist Oct. 1997 No. 2103.

Most individuals receive about 2.5 mSv every year from exposure to natural sources, including cosmic rays and the uranium in granite bedrock. In general individuals who are subject to 1000 mSv or more develop radiation sickness requiring immediate medical attention. Half of all individuals exposed to 4500 mSv will die within 60 days. Even small doses can increase the risk of cancer. On average, if 2,500 people are exposed to a single rem of radiation, one will die of induced cancer. The US EPA recommends that a contaminated area be abandoned if decontamination efforts cannot reduce the extra risk of cancer death to about one in 10,000.

WELDING FUMES:

In addition to complying with any individual exposure standards for specific contaminants, where current manual welding processes are used, the fume concentration inside the welder's helmet should not exceed 5 mg/m3, when collected in accordance with the appropriate standard (AS 3640, for example).

ES* TWA: 5 mg/m3

TLV* TWA: 5 mg/m3, B2 (a substance of variable composition)

OES* TWA: 5 mg/m3

Most welding, even with primitive ventilation, does not produce exposures inside the welding helmet above 5 mg/m3. That which does should be controlled (ACGIH). Inspirable dust concentrations in a workers breathing zone shall be collected and measured in accordance with AS 3640, for example. Metal content can be analytically determined by OSHA Method ID25 (ICP-AES) after total digestion of filters and dissolution of captured metals. Sampling of the Respirable Dust fraction requires cyclone separator devices (elutriators) and procedures to comply with AS 2985 (for example).

NITROGEN DIOXIDE:

Odour Threshold Value: 0.11-0.14 ppm

NOTE: Detector tubes for nitrogen dioxide, measuring in excess of 0.5 ppm, are commercially available.

The TLV-TWA is considered to be sufficiently low to reduce the potential

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for immediate injury or adverse physiological effects from prolonged daily exposures. Although industrial data may contradict this conclusion, this data is not sufficiently precise to invalidate the TLV.
Short exposures of workmen to nitrogen dioxide concentrations averaging 25 to 38 ppm resulted in observable physiological response, but exposures of 3 to 5 minutes at 80 ppm produced tightness of the chest.

OZONE:

NOTE: Detector tubes for ozone, measuring in excess of 0.05 ppm, are commercially available.
Exposure at 0.2 ppm appears to produce mild acute but not cumulative effects. It is thought that exposures of the order of 0.1 ppm will be tolerated by most workers including asthmatics. Chronic exposure at 0.1 ppm or more can induce significant adverse effects in the lower respiratory tract of both normal and atopic individuals.
Human exposure for 2 hours at an average concentration of 1.5 ppm ozone resulted in a 20% reduction in timed vital capacity of the lung and other effects. Concentrations of ozone in excess of a few tenths ppm cause occasional discomfort to exposed individuals manifest as headache, dryness of the throat and mucous membranes of the eyes and nose following exposures of short duration.
Exposure to ozone during moderate to heavy work loads results in significantly decreased forced vital capacity (FVC) and forced expiratory volume in one second (FEV1) at 0.12 ppm; this is effect is greater at higher concentrations.

PERSONAL PROTECTION

EYE

Welding helmet with suitable filter. Welding hand shield with suitable filter.
- Contact lenses may pose a special hazard; soft contact lenses may absorb and concentrate irritants. A written policy document, describing the wearing of lens or restrictions on use, should be created for each workplace or task. This should include a review of lens absorption and adsorption for the class of chemicals in use and an account of injury experience. Medical and first-aid personnel should be trained in their removal and suitable equipment should be readily available. In the event of chemical exposure, begin eye irrigation immediately and remove contact lens as soon as practicable. Lens should be removed at the first signs of eye redness or irritation - lens should be removed in a clean environment only after workers have washed hands thoroughly. [CDC NIOSH Current Intelligence Bulletin 59].
For most open welding/brazing operations, goggles, even with appropriate filters, will not afford sufficient facial protection for operators. Where possible use welding helmets or handshields corresponding to AS 1336 and AS 1338 which provide the maximum possible facial protection from flying particles and fragments. [WRIA-WTIA Technical Note 7].

HANDS/FEET

Welding Gloves
Safety footwear.

OTHER

Overalls.
- Eyewash unit.
Aprons, sleeves, shoulder covers, leggings or spats of pliable flame resistant leather or other suitable materials may also be required in positions where these areas of the body will encounter hot metal.

RESPIRATOR

Selection of the Class and Type of respirator will depend upon the level of breathing zone contaminant and the chemical nature of the contaminant. Protection Factors (defined

continued...

as the ratio of contaminant outside and inside the mask) may also be important.

Breathing Zone Level ppm (volume)	Maximum Protection Factor	Half- face Respirator	Full- Face Respirator
1000	10	BE- AUS	-
1000	50	-	BE- AUS
5000	50	Airline *	-
5000	100	-	BE- 2
10000	100	-	BE- 3
	100+		Airline**

* - Continuous Flow ** - Continuous-flow or positive pressure demand.

The local concentration of material, quantity and conditions of use determine the type of personal protective equipment required.
For further information consult site specific CHEMWATCH data (if available), or your Occupational Health and Safety Advisor.

ENGINEERING CONTROLS

- For gas tungsten arc welding operations the nature of ventilation is determined by the location of the work. For outdoor work, natural ventilation is generally sufficient.
- For indoor work, conducted in either open or limited spaces , use mechanical (general exhaust or plenum) ventilation . (Open work spaces exceed 300 cubic metres per welder)
- For work conducted in confined spaces, mechanical ventilation, using local exhaust systems, is required. (In confined spaces always check that oxygen has not been depleted by excessive rusting of steel or snowflake corrosion of aluminium)

Mechanical or local exhaust ventilation may not be required where the process working time does not exceed 24 mins. (in an 8 hr. shift) provided the work is intermittent (a maximum of 5 mins. every hour). Local exhaust systems must be designed to provide a minimum capture velocity at the fume source, away from the worker, of 0.5 metre/sec.
If risk of inhalation or overexposure exists, wear SAA approved respirator or work in fume hood.
During dry point grinding of 2% thoriated electrode, the airborne thorium concentration in the vicinity of the operation can be greater than 1 x 10^ -1 Bq/m3. For this operation, a dedicated grinding machine with suitable air extraction and collector of waste particles is recommended. Ensure no airborne dust is created when collecting or disposing of waste.
For GTAW (TIG) welding ventilation should be based on fumes from filler metals and shielding gases.

Section 9 - PHYSICAL AND CHEMICAL PROPERTIES

APPEARANCE

Silver grey metal rod.

PHYSICAL PROPERTIES

Does not mix with water.
Sinks in water.

Molecular Weight: Not applicable.
Melting Range (℃): 3380
Solubility in water (g/L): Immiscible
pH (1% solution): Not applicable.
Volatile Component (%vol): Not applicable
Relative Vapour Density (air=1): Not applicable

Boiling Range (℃): Not a vailable.
Specific Gravity (water=1): 19.3
pH (as supplied): Not applicable
Vapour Pressure (kPa): Not applicable
Evaporation Rate: Not applicable
Flash Point (℃): Not applicable

continued...

Lower Explosive Limit (%): Not applicable
Upper Explosive Limit (%): Not applicable
Autoignition Temp (℃): Not applicable
Decomposition Temp (℃): Not available.
State: Manufactured
Viscosity: Not Applicable

Section 10 - CHEMICAL STABILITY AND REACTIVITY INFORMATION

CONDITIONS CONTRIBUTING TO INSTABILITY

- Presence of incompatible materials.
- Product is considered stable.
- Hazardous polymerisation will not occur.

Section 11 - TOXICOLOGICAL INFORMATION

POTENTIAL HEALTH EFFECTS

ACUTE HEALTH EFFECTS

SWALLOWED
Not normally a hazard due to physical form of product.

EYE
Fumes from welding/brazing operations may be irritating to the eyes.
Arc rays can injure eyes.

SKIN
Skin contact does not normally present a hazard, though it is always possible that occasionally individuals may be found who react to substances usually regarded as inert.
Arc rays can burn skin.

INHALED
Fumes evolved during welding operations may be irritating to the upper-respiratory tract and may be harmful if inhaled.
Harmful levels of ozone may be found when working in confined spaces. Symptoms of exposure include irritation of the upper membranes of the respiratory tract and lungs as well as pulmonary (lung) changes including irritation, accumulation of fluid (congestion and oedema) and in some cases haemorrhage. Exposure may aggravate any pre-existing lung condition such as bronchitis, asthma or emphysema.

CHRONIC HEALTH EFFECTS
Principal route of exposure is inhalation of welding fumes from electrodes and workpiece. Reaction products arising from electrode core and flux appear as welding fume depending on welding conditions, relative volatilities of metal oxides and any coatings on the workpiece. Studies of lung cancer among welders indicate that they may experience a 30 -40% increased risk compared to the general population. Since smoking and exposure to other cancer-causing agents, such as asbestos fibre, may influence these results, it is not clear whether welding, in fact, represents a significant lung cancer risk. Whilst mild steel welding represents little risk, the stainless steel welder, exposed to chromium and nickel fume, may be at risk and it is this factor which may account for the overall increase in lung cancer incidence among welders. Cold isolated electrodes are relatively harmless.
Welding fume with high levels of ferrous materials may lead to particle deposition in the lungs (siderosis) after long exposure. This clears up when exposure stops. Chronic exposure to iron dusts may lead to eye disorders.
Ozone is suspected to produce lung cancer in laboratory animals; no reports of this effect have been documented in exposed human populations.

continued...

Other welding process exposures can arise from radiant energy UV flash burns, thermal burns or electric shock
The welding arc emits ultraviolet radiation at wavelengths that have the potential to produce skin tumours in animals and in over-exposed individuals, however, no confirmatory studies of this effect in welders have been reported.
Natural radioactivity from the thorium oxide is considered to be well below occupational exposure standards. Although thoria is released in welding and exceeds the recommended threshold value of 0.9 alpha disintegrations/(min)/m3 at a distance of 6 inches from the arc, levels measured at the breathing zone of the welder were substantially lower than this.
For cold, unused electrodes the exposure route is low level ionising radiation from the thoria content. Anticipated dose rate on handling will not exceed 7.5 micro Sievert per (working) hour. This means that the Annual Limits of Intake by workers will not exceed the NOHSC Standard of 20 milliSievert per year as a 5 year average.

TOXICITY AND IRRITATION
Not available. Refer to individual constituents.
unless otherwise specified data extracted from RTECS - Register of Toxic Effects of Chemical Substances

TUNGSTEN:

TOXICITY	IRRITATION
Unk. route (rat) LD50: 2000 mg/kg	Skin (rabbit) 500mg/24h- Mild
Eyes (rabbit) 500mg/24h-mild	
Substance has been investigated as a reproductive effector in female rodents- Oral TDLo 1.16 mg/kg	

THORIUM OXIDE:

TOXICITY	IRRITATION
Intravenous (rat) TDLo: 160 mg/kg (liver tumours)	Nil Reported
Substance has been investigated as a tumorigen; Tumorigenic-carcinogenic in humans by RTECS criteria. Tumours, angiosarcoma, lymphoma recorded.	

Tenth Annual Report on Carcinogens: Substance known to be Carcinogenic [National Toxicology Program: U.S. Dep. of Health and Human Services 2002].

WELDING FUMES:
Not available. Refer to individual constituents.
WARNING: This substance has been classified by the IARC as Group 2B: Possibly Carcinogenic to Humans.

NITROGEN DIOXIDE:

TOXICITY	IRRITATION
Inhalation (human) LCLo: 200 ppm/ 1m	Nil Reported
Inhalation (man) TCLo: 6200 ppb/10m	
Substance has been investigated as a mutagen and reproductive effector. NOTE: Interstitial edema, epithelial proliferation and, in high concentrations, fibrosis and emphysema develop after repeated exposure.	

OZONE:

TOXICITY	IRRITATION
Inhalation (human) LCLo: 50 ppm/30m	Eye (rabbit): 2 ppm/4h
Inhalation (human) TCLo: 1 ppm	

continued...

Inhalation (rabbit) LC50: 36 ppm/3m
NOTE: Aggravates chronic obstructive pulmonary diseases. Suspected also of increasing the risk of acute and chronic respiratory disease, mutagenesis and fetotoxicity. In animals short-term exposure to ambient concentrations of less than 1 ppm results in reduced capacity to kill intrapulmonary organisms and allows purulent bacteria to proliferate [Ellenhorn etal]

MATERIAL	CARCINOGEN	REPROTOXIN	SENSITISER	SKIN
thorium oxide	NTPA			

CARCINOGEN
NTPA: US National Toxicology Program (NTP) 11th Report Part A Known to be Human Carcinogens: thorium oxide Category:

Section 12 - ECOLOGICAL INFORMATION

No data for CIGWELD Tungsten Welding Electrodes.
Refer to data for ingredients, which follows:

OZONE:
The material is classified as an ecotoxin* because the Fish LC50 (96 hours) is less than or equal to 0.1 mg/l

* Classification of Substances as Ecotoxic (Dangerous to the Environment) Appendix 8, Table 1
Compiler's Guide for the Preparation of International Chemical Safety Cards: 1993 Commission of the European Communities.

Section 13 - DISPOSAL CONSIDERATIONS

- Recycle wherever possible or consult manufacturer for recycling options.
- Consult State Land Waste Management Authority for disposal.
- Bury residue in an authorised landfill.
- Recycle containers if possible, or dispose of in an authorised landfill.

Section 14 - TRANSPORTATION INFORMATION

HAZCHEM: None

NOT REGULATED FOR TRANSPORT OF DANGEROUS GOODS:UN, IATA, IMDG

Section 15 - REGULATORY INFORMATION

POISONS SCHEDULE: None

REGULATIONS
tungsten (CAS: 7440-33-7) is found on the following regulatory lists;
Australia Exposure Standards

continued...

Australia Inventory of Chemical Substances (AICS)
OECD Representative List of High Production Volume (HPV) Chemicals

thorium oxide (CAS: 1314-20-1) is found on the following regulatory lists;
Australia Inventory of Chemical Substances (AICS)

welding fumes (CAS No:Not avail):
No regulations applicable

nitrogen dioxide (CAS: 10102-44-0) is found on the following regulatory lists;
Australia - Australia New Zealand Food Standards Code - Processing Aids - Permitted bleaching agents, washing and peeling agents and in water used as an ingredient in other foods
Australia - Queensland Hazardous Materials and Prescribed Quantities for Major Hazard Facilities
Australia Exposure Standards
Australia Inventory of Chemical Substances (AICS)
Australia National Pollutant Inventory

ozone (CAS: 10028-15-6) is found on the following regulatory lists;
Australia - Australia New Zealand Food Standards Code - Processing Aids - Permitted bleaching agents, washing and peeling agents and in water used as an ingredient in other foods
Australia - Australia New Zealand Food Standards Code - Processing Aids - Permitted processing aids used in packaged water and in water used as an ingredient in other foods
Australia Exposure Standards

No data available for welding fumes as CAS: Not avail.

Section 16 - OTHER INFORMATION

INGREDIENTS WITH MULTIPLE CAS NUMBERS

Ingredient Name	CAS
cerium(IV) oxide	1306- 38- 3, 23322- 64- 7

Issue Date: 19-Dec-2006

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Print Date: 19-Dec-2006